INDEX TO SURGICAL PROGRESS.

GENERAL SURGERY.

I. The Use in Surgery of Solutions of Sodium Chloride with Sodium Carbonate. By E. TAVEL. In 1889, Buchner showed that the addition of distilled water to the body juices very quickly lowered their bactericidal powers, but that if normal salt solution was used instead of the distilled water no such lowering took place. Struck by this observation, the author suggested to Kocher that salt solution ought to replace sterile water as an irrigating fluid.

In 1890, v. Fodor proved that the absorption of certain substances into the blood greatly modified its bactericidal power. The absorption of hydrochloric or tartaric acid leaves the bactericidal power unchanged or diminished; the absorption of salt or of soda increases it considerably. Fodor concluded that the bactericidal power of the blood was due to its alkalinity. His best results were obtained with carbonate of soda, which increased the bactericidal power from 23 to 70 per cent.

Tavel formulates and studies the following proposition: "Would it not be logical to use for irrigation of wounds a fluid containing not merely the normal supply of salt, but one having the normal alkalinity of the blood, viz., 2 to 2½ per cent.?"

Asepsis and antisepsis have a common aim, viz., to secure the least possible contamination of the wound. The aim of the surgeon must be to contaminate the wound as little as possible, to preserve the histologic and physiologic integrity of the tissues, so that they, by agents at their disposal (phagocytes and serum), may destroy the few microbes which inevitably enter the wound during an operation.

The conservation of the bactericidal agents of the body (or perhaps their exaltation) has been sought by making use of "dry asepsis," "moist asepsis," rapidity in operating. When antiseptic solutions are employed, their value depends on the stimulation of phagocytosis and leucocytosis. Rapidity of operation is of importance, but is not applicable in all cases or by all surgeons.

Dry Asepsis.—Walthard, experimenting under the author's direction, found that mere exposure of the abdominal contents to the air produced changes in the peritoneum which led to the formation of adhesions, while, if the abdominal contents were protected from the air by compresses kept moist with saline-soda solution, no such adhesions formed. Wagner has noticed fatty degeneration of the superficial cells of the peritoneum in rabbits after the injection of air into the peritoneal cavity. Delbét has described necrotic changes in the endothelium following exposure to the air. Walthard continued his experiments in Horsley's laboratory, endeavoring to ascertain if the ill effect of air was due to the chemical action of its oxygen or desiccation. A current of filtered air passed through the peritoneum produced the same effects already noted (adhesions). Currents of oxygen, of carbonic dioxide of nitrogen passed through the cavity as a moist vapor produced no adhesions. He concluded that superficial desiccation produced by the air is the cause of the above mentioned peritoneal lesions. These experiments, never contradicted, but frequently confirmed by clinical experience, show "dry asepsis" to be not without drawbacks.

Moist Asepsis.—Walthard's researches show "moist" to be better than "dry" asepsis. It remains to discover the best solution, one which will be innocuous to the tissues, and at the same time favor phagocytosis, be capable of preservation a certain time without altering and without acting as a culture ground for microbes which may accidentally enter it, and which will serve for the sterilization of compresses, tampons, etc.

Tavel believes that he has found such an ideal material in

his solution of salt and soda. Experiment shows that the salt-soda solution, whether warm or cold, may be kept for a long time without becoming infected, and that any bacteria which may be accidentally introduced into it perish after the lapse of a short time.

When injected subcutaneously or into a vein, salt-soda solution has a marked ability to produce leucocytosis, as the following table shows:

Intravenous injection, 7 cubic centimetres solution, increased leucocytes 3 times; duration, 7 days.

Intravenous injection, 2 cubic centimetres solution, increased leucocytes 1½ times; duration, 1 day.

Intravenous injection, 2 cubic centimetres solution, increased leucocytes 1¾ times; duration, 3 days.

Intravenous injection, 8 cubic centimetres solution, increased leucocytes 1¼ times; duration, 2 days.

The author makes the following claims for his solution: "It is preferable to ordinary water for the sterilization of dressings; it remains sterile for a long time; prevents the formation of adhesions, does not irritate the tissues, provokes marked leucocytosis, has positive chemiotactic action, and excites the bactericidal functions of the organism without injuring the tissues as do antiseptics."

Preparation of salt-soda solution. The strength of the solution is, NaCl. 7½ $^{0}/_{00}$ + Na_2CO_3 2½ $^{0}/_{00}$. When made with distilled water, the solution is at first clear, but by the next day there is a slight deposit. When hot or boiled water is used there is a flocculent precipitate, which sinks rapidly; hydrant water gives a still greater precipitate, making the solution opalescent for twenty-four hours.—*Revue de Chirurgie,* May, 1902, p. 578.

I. Heart Surgery. By B. MERRILL RICKETTS, M.D. (Cin-

THORAX AND ABDOMEN.

I. Heart Surgery. By B. MERRILL RICKETTS, M.D. (Cincinnati). Experimental physiology and surgery show what can be done in heart surgery. Twenty-five dogs were used in experi-